Physiological & Methodological Aspects of Training According to the Functional Areas

Functional Area	*Main Energy Sources*	*Type of Training*	*Total Work (work rest)*	*Micro-Macro-Pause*	*Hours of Rest bet. Stimuli*	*# of stimuli per week (based on 10 x week)*	*% of total volume of training*	*Model Workout sets for each Functional area*	*% of Intensity vs. life-time best*
WARM UP	Fat & Lactic Acid	Continuous	20' - 45'		6-8	8 - 12	17 - 20%	Continuous Swimming Long Distances With 5" to 10" rest	
SUBAEROBIC	Fat & Lactic Acid	Long Interval Training	40' - 90'	15" -45"	12	4 - 6	50%	1x3000 2-3x1500w/40-90" 4-6x800w/30-45" 8-12x400w/20" 14-20x200w/10-15"	90 - 95% 88 - 89% 86 - 87% 84 - 85% 81 - 82%
SUPER-AEROBIC	Glycogen very little fat	Short Interval Training	25' - 45'	30" - 45"	24	3 - 5	18 - 20%	3-4x800w/45-90" 4-8x400w/30-60" 8-12x200w/30-45" 16-20x100w/30-40"	90 - 92% 87 - 89% 84 - 85% 81 - 82%
VO2 MAXIIMUM	Glycogen	Short Interval Training	12' - 20'	45" - 2'30"	36	2 - 3	5 - 7%	2-4x400w/1-2'30" 4-6x200w/1-1'15" 6-10x100w/1-1'15" 16-20x50w/45"-1'	92 - 93% 88 - 90% 84 - 86% 80 - 83%
LACTATE ANAEROBIC RESISTANCE	Glycogen	Progressive Interval Training Long tempo	As long as it takes to complete the set observing that this is maximum intensity	1' - 3'	48 - 72	1 - 2	2%	4x200w2-3' 6x100w/1'30"-2' 12x50w/1'-1'15"	90 - 93% 88 - 90% 86 - 88%
LACTATE ANAEROBIC TOLERANCE	Glycogen	Tempo training race rhythm		3' - 12 '				2-3x300w/8-12' 2-4x200w/8-12' 4-6x100w/5-7' 8-10x50w/3-4'	max. effort w/ shorter distances
LACTATE ANAEROBIC POWER	Glycogen	Tempo Training Sprint Tempo		2' - 5' Micro 3' - 10' Macro				2x(2x100w/5")w7-10' 2x(3x75w/4')w/5-8' 2x(3-4x50w/3')w/5' 2x(6-8x25w/2')w/3-4'	95 - 100% Broken Sets 200 (50's w/5") 100 (50's w/5")
ACCELERATION SPEED	ATP	Fractioned Sprint Training		1'/1'30" - 3'	24	4 - 5	2 - 3 %	2-4 sets x(3-4 rep's x12-18 mts Dur. 6-8"	
IN MOTION SPEED	ATP	Fractioned Wind Sprint		1' -2' / 4' - 5'				2x(4x last 12 mts) In to the wall	
PROLONGED SPEED	ATP - CP	Fractioned Tempo Sprint		1'30" - 2'30" 5' - 6'				2-3 sets x (3-4 rep's x20-25 mts Dur. 10-12"	
RESISTANCE TO SPEED	PC + Lactate	Fractioned Very fast tempo		2' - 3' 5' - 7'	72	1	1 %	2x(4x30-35 mts) Dur. 14-20" 1-2x20,25,30,35mts	

PHYSIOLOGICAL EFFECTS OF ALL THE FUNCTIONAL AREAS

WARM - UP:
- Activation of the aerobic system.
- Homodynamic stimulation of the cardiovascular system.
- Removal and oxidation of residual lactate.

SUBAEROBIC:--
- Preserves the reserves of glycogen allowing a super compensation (hyper-carbohydrates).
- Maintains the aerobic capacity.
- Augments the lipolitic capacity and the oxidation levels of fatty acids.

SUPERAEROBIC:
- Augments the capacity of the mechanism of production removal of lactate (lactate turnover) during and after the effort.
- Augments the capacity of the mitochondria to metabolize the molecules of pirúvico acid.

VO2 MAXIMUN:
- Augments the aerobic power, since it increases the speed with which the mitochondria oxidates pirúvico acid, improving the speed of the chemical reactions of Krebs cycle and breathing cadence.

LACTATE ANAEROBIC RESISTANCE:
- Progressively develops the ability to perform higher workloads with higher levels of lactate.

LACTATE ANAEROBIC TOLERANCE:
- Increases the capacity to tolerate coordinated contraction of the "fast twitch" muscle fibers in the presence of high lactate levels.
- Increases buffer capacity (bicarbonate.)

LACATE ANAEROBIC POWER:
- Increases the glycolityc anaerobic speed.

ACCELERATION IN MOTION SPEED:
- Increases speed of liberation of energy from the ATP.
- Stimulates resynthesis of ATP from CP.

PROLONGED SPEED:
- Improves the continuos supply of energy on behalf of the alactic anaerobic system (ATP + CP).
- Increases the speed of breaage and resynthesis of ATP & CP (alac. Power).
- Increases the reserve of ATP-CP.

RESISTANCE TO SPEED:--
- Improves the speed os substitution of the anaerobic alactic system, for the lactic anaerobic system in a continuos action of generation of anaerobic energy.
- Increases the anarobic glycolotic speed (greater lactic anaerobic power).

% OF TIME BASED ON ELITE ATHLETES AND THEIR PERSONAL RECORDS

When athletes are of lesser ability, or have not reached the Olympics, they can still use the chart above, allowing a 1 percentile per level of competition below the World or Olympic qualifier level. In other words:

1 % for athletes who make OT's cuts
2 % for those who make Senior Nationals
3 % for those who make Junior Nationals
4 % for athletes who make Sectionals
5 % for athletes making JO's

In other words if the pace to hold at Anaerobic Threshold or Superaerobic training for an Olympic finalist that must swim under 1:50, this athlete needs to repeat in training: 10 x 200 meters, w/30"-40" rest, holding 2:07+ pace, leaving probably on 2:40 or 2:45. Looking closely at the chart it reads that you will repeat at 84% to 85% based on your PR, i.e. 110 x 1.16 = 127.6, the athlete making Olympic trials, trying the same set whose best time is 1:54+ needs to hold 2:13+ and will restart on 2:45 to 2:55 in order to optimize his training. Sure this athlete can go "harder" and try to keep up with the first swimmer, but he will either train a VO2 Max, then he may not last all 10 repetitions, or will be accumulating fatigue which can lead to over training symptoms. By the same token the 16 year old swimmer who qualifies for the Junior Olympics and has a best time of 2:13+, this swimmer needs to train the same set of 200's holding at 79% of his best time for the duration of the set or: 133"x 1.21= 2:40+ restarting on the 3:10, when he can repeat at that speed, then the next time it is fairly easy to see improvement by either shortening the resting interval or improving on the speed of swim. The important thing here is to respect the rest and percentages suggested in order to optimize the training that your swimmer performs.